

SECTION 601 RIPRAP

601.01. DESCRIPTION.

This work shall consist of furnishing and placing Riprap protection of the type specified at the locations and in reasonably close conformity with the lines and dimensions shown on the Plans or established by the Engineer. The types of Riprap are as follows:

Type I	Plain Riprap
Type I-A	Plain Riprap with Filter Blanket
Type II	Special Plain Riprap
Type II-A	Special Plain Riprap with Filter Blanket
Type III	Laid Up Riprap
Type IV	Grouted Riprap

601.02. MATERIALS.

Materials shall meet the requirements specified in the following Subsections of Section 700 - Materials:

Portland Cement	701.02
Fine Aggregate	701.05
Filter Fabric	712.04
Stone for Riprap	713.02
Filter Blanket	713.03

601.04. CONSTRUCTION METHODS.

- (a) **General.** Shape and dress slopes, ditches, and areas to be protected to the lines and grades shown on the Plans. Where Type III or Type IV construction is specified, compact the base in accordance with Subsection 501.04 before placing the Riprap .
- (b) **Filter Blanket.** When specified, place filter blanket in one or two layers as indicated on the Plans. When material is stockpiled at the job site, follow guidelines in Subsection 106.09.

Spread each layer uniformly on the prepared base, in a satisfactory manner, to the neat lines indicated. Repair any damage to the surface of the filter blanket during placing of the blanket before proceeding with the work. Compaction of the filter blanket will not be required, but finish it to present a reasonably even surface free from mounds or windrows.

- (c) **Filter Fabric.** When filter fabric is specified, place it to conform to Plan details. Areas on which filter fabric is to be placed shall have a uniform slope and be reasonably smooth, free from mounds and windrows, and free of any debris or projections which could damage the filter fabric to be placed on it.

Loosely lay the material (do not stretch it). Overlap adjacent strips by a minimum of 2 feet (0.6 m). Support the fabric at all times to maintain its intended position. All methods of fabric support and all methods of holding the fabric in place shall be approved by the Engineer. Laps in filter fabric shall be made in conformance with Section 602.04(d).

If there is any filter fabric damage or displacement before fabric placement, during fabric placement, or during Riprap placement, replace or repair it to the satisfaction of the Engineer at the your own expense.

During periods of shipment and storage, protect the filter fabric from direct sunlight, ultraviolet rays, temperature greater than 140°F (60°C), mud, dirt, dust and debris. To the extent possible, keep the fabric wrapped in a heavy-duty protective covering.

Schedule the work so that the filter fabric is covered or otherwise protected within 30 days after it's placed. Failure to comply with this requirement shall require replacement of the fabric.

- (d) **Types I, I-A, II and II-A.** The areas to be protected shall be dressed approximately to the lines and grades shown on the Plans prior to placing Riprap or the filter blanket, when a filter blanket is specified.

Dump plain Riprap and special plain Riprap, graded so that the smaller stone is uniformly distributed throughout the mass, dumped over the area designated until the required depth is attained. Hand or machine placing will be required as is necessary to deposit the stones to the general lines and to the thickness shown on the Plans.

- (e) **Type III.** Excavate the foundation for Riprap below probable scour or the elevation shown on the Plans, and do not lay stone or place concrete until the footing is approved by the Engineer.

Fill spaces between stones with spalls which have been securely rammed into place. he finished wall shall present an even, tight, and reasonably plain surface of the contour required. If points of stones project beyond the surface of the wall, break them off.

- (f) **Type IV.** Excavate the foundation for Riprap below probable scour or to the elevation shown on the Plans, and do not lay stone or place concrete until the footing is approved by the Engineer.

Place the stones with their beds at the approximate angle to the slopes as indicated on the Plans. Lay them in close contact and so as to break joints; thoroughly key the individual stones into the wall. Take care during this procedure to keep earth or sand from filling the spaces between the stones.

Immediately after the stones are in place, wet them thoroughly; then place the grout, completely filling the spaces between the stones from bottom to top. Sweep the surface swept with a stiff broom.

NOTE: No Riprap shall be grouted in freezing weather and in hot, dry weather the work shall be protected from the sun and kept moist for at least 3 days after grouting.

Grout for grouted Riprap shall consist of one part of portland cement and 3 parts fine aggregate by volume, thoroughly mixed with water, to produce grout having the proper consistency.

NOTE: Retempering of grout will not be permitted.

601.05. METHOD OF MEASUREMENT.

Type I and Type I-A. Measure plain Riprap or plain Riprap and filter blanket separately by the ton (metric ton).

Type II and Type II-A. Measure special plain Riprap or special plain Riprap and filter blanket separately by the ton (metric ton).

Type III. Measure laid up Riprap by the square yard (square meter). This measurement covers the whole face area, regardless of thickness, and including additional thickness at base of walls.

Type IV. Measure grouted Riprap by the square yard (square meter). This measurement covers the whole face area, regardless of thickness, including additional thickness at the base of walls. Scales for weighing shall meet the requirement of Subsection 109.01.

Filter Fabric. Measure filter fabric complete in place by the square yard (square meter) of area covered. Laps will not be measured for payment.

601.06. BASIS OF PAYMENT.

Accepted Riprap, measured as provided above, will be paid for at the contract unit price as follows:

(A)	TYPE I	PLAIN RIPRAP	TON (METRIC TON)
(A-1)	TYPE I-A	PLAIN RIPRAP	TON (METRIC TON)
(A-2)	TYPE I-A	FILTER BLANKET	TON (METRIC TON)
(B)	TYPE II	SPECIAL PLAIN RIPRAP	TON (METRIC TON)
(B-1)	TYPE II-A	SPECIAL PLAIN RIPRAP	TON (METRIC TON)
(B-2)	TYPE II-A	FILTER BLANKET CUBIC	TON (METRIC TON)
(C)	TYPE III	LAID UP RIPRAP	SQUARE YARD (SQUARE METER)
(D)	TYPE IV	GROUTED RIPRAP	SQUARE YARD (SQUARE METER)
(E)		FILTER FABRIC (RIPRAP)	SQUARE YARD (SQUARE METER)

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

SECTION 602

GABIONS AND REVEMENT MATTRESSES

602.01. DESCRIPTION.

This work shall consist of furnishing and placing both stone-filled wire-mesh baskets and plastic filter fabric in close conformity with the line, grades, dimensions, and details shown on the plans or established by the Engineer. Gabions and revetment mattresses are used to retain embankments and control erosion.

Gabions are wire-mesh baskets—box or rectangular shaped—filled in-place with hard, durable stone. Gabions have a minimum thickness of 1 foot (0.3 m).

Revetment Mattresses are similar to gabions except they have a maximum thickness of 1 foot (0.3 m) and are always rectangular baskets.